

## Information Form for SJTU Graduate Profession Courses

Basic Information				
* Course Name	Chinese			
	English Crystalization Principle			
* Credits	2	* Teaching Hours	32 1 =16	
* Semester	Fall	* Cross-semester?	No	Spanning over Semesters
* Course Type	Program Elective Course	* Course Type	Both full & part time students	
* Course Category	Specialized Course	Targeting Students	Doctoral Level	
* Instruction Language	Chinese	Teaching Method	In class teaching	
* Grade	Letter grading			
				wangqudong@sjtu.edu.cn
Extended Information				
* ( ) Course Description	200			
* English Course Description	<p>This course focuses on the basic laws of crystal growth and explains the basic phenomena during growth. Main content includes: theory of heat, mass and momentum transmission, temperature field, solute condensation, liquid flow effect and formation of growth layer; component undercooling and interfacial stability; the phase equilibrium and phase diagram, the macroscopic properties and microstructure of interface are discussed from thermodynamics and statistical physics; kinetic process of crystal growth-- nucleation and growth processes. Starting from the general process of crystallization of metal materials, the crystallization of primary phase and eutectic are introduced; crystal growth during film preparation; recrystallization and grain growth of metals.</p> <p>Aim of course Through the study of this course, master and understand the primary phase and eutectic crystallization process of metal melt, metal recrystallization and grain growth, thin film crystal growth and other crystal growth physical basis, crystal growth process.</p>			

* ( ) Syllabus			
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* English Syllabus	Content	Hours	Format
	Introduction	2	Teaching
	Chapter1 Solute condensation and mass transport	2	Teaching
	Chapter1 Mixed transfer of heat and mass	2	Teaching
	Chapter3 Growth rate fluctuation and growth layer	2	Teaching
	Chapter4 Interfacial stability and component undercooling	2	Teaching
	Chapter5 Macro-proper microstructure of interface Section 1 Interface energy and interfacial tension Section 2 Interface handover	2	Teaching
	Section 3 Phase balance at curved interface Section 4 Meniscus and straight pull growth	2	Teaching
	Chapter6 Nucleation	2	Teaching
	Chapter7 Growth kinetics	2	Teaching
	Chapter8 Primary phase growth of alloy Section 1 Morphology of facet primary phase Section 2 Morphology of non-facet primary phase	2	Teaching
	Section 3 Brody-Flemings model of dendrite arrangement Section 4 Effect of fluid flow on crystal growth	2	Teaching
	Chapter9 Eutectic growth Section 1 eutectic nucleation Section 2 Normal eutectic growth	2	Teaching
	Section 3 Abnormal eutectic growth Section 4 Symbiotic zone	2	Teaching
	Chapter10 Crystal growth during film preparation	2	Teaching
	Chapter11 Recrystallization and grain growth of metals	2	Teaching

	Section 1 Recrystallization nucleation Section 2 Recrystallization grain growth		
	Section 3 Static and dynamic recrystallization Section 4 Continuous recrystallization and discontinuous recrystallization Section 5 Effect of second phase on recrystallization	2	Teaching
* Requirements	50 1		
* English Requirements	Submit a review paper depending on your interest.		
* Resources	1. Roy Elliott. Eutectic Solidification Processing. Butterworths & Co(Publishers) Ltd. 1983 2. . 1982 3. . 1999 4. . 1995 5. 1994 6. ( )æ. æ. 1985		
* English Resources	1. Roy Elliott. Eutectic Solidification Processing. Butterworths & Co(Publishers) Ltd. 1983 2. Naiben Min. Physical basis of crystal growth. Shanghai Science and Technology Press. 1982 3. Weizhuo Zhong, SukunHua. Morphology of Crystal Growth. Science Press. 1999 4. Lianzeng Yao. Crystal growth foundation. China University of Science and Technology Press. 1995 5. Weimin Mao, Xinbing Zhao. Recrystallization and grain growth of metals. Metallurgical Industry Press. 1994 6. (Russia)æ. æ. Gregory. Recrystallization of metals and alloys. 1985		
Note			